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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/618,492

07/11/2003

Noh Yeal Kwak

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4743

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09/22/2004

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EXAMINER

SARKAR, ASOK K

ART UNIT

PAPER NUMBER

2829

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/618,492	KWAK, NOH YEAL	
	Examiner	Art Unit	
	Asok K. Sarkar	2829	<i>JS</i>

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1 – 16 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1 – 4 and 9 – 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Fukasaku, US 6,362,059.

Regarding claims 1, 4, 9 and 12, Fukasaku teaches a method of manufacturing a semiconductor device, comprising :

- providing a semiconductor substrate 1 for which given processes for forming the semiconductor device are have been implemented (see Fig. 3A);
- implanting boron for forming a p well 6 in the semiconductor substrate by means of an ion implantation process (see 3D); and
- implanting a Group III monoatomic dopant In having a higher atomic weight than boron at a given depth 7 within the p well of the semiconductor substrate by

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means of an ion implantation process, thus forming an ion implantation layer 7 in the p well 6 (see 3D) with descriptions in column 4, lines 55 – 60.

Regarding claims 2 and 10, Fukasaku teaches forming the screen oxide film 5 (Fig. 3C) before the dopants are implanted in column 4, lines 48 – 52.

Regarding claims 3 and 10, Fukasaku teaches implanting the Group III, In dopant at a concentration range of 5×10^{11} - 1×10^{13} ion/cm² with an energy range of 10 – 50 KeV in column 4, lines 57 – 59.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukasaku, US 6,362,059 in view of Chen, US 5,605,849.

Fukasaku fails to teach implantation at tilt angle of 3 – 13°.

Chen teaches that implantation at tilt angle of 3 – 13° relative to the vertical

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reduces undesirable channeling along crystal structure for the benefit of obtaining accurate dopant profiling in column 1, lines 45 – 56.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Fukasaku and perform implantation at tilt angle of 3 – 13° to reduce undesirable channeling along crystal structure and for the benefit of obtaining accurate dopant profiling as taught by Chen in column 1, lines 45 – 56 so that the oxidation layer thickness can be accurately controlled.

7. Claims 6 – 8 and 14 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukasaku, US 6,362,059 in view of Ramkumar, US 6,555,484 and Tsai, US 6,245,639.

Regarding these claims Fukasaku fails to teach (1) annealing treatment to activate the dopant and (2) rapid thermal annealing process at a rate of 20 – 50°C/sec for 5 – 30 seconds in nitrogen atmosphere.

Regarding element 1, Ramkumar teaches the step of annealing for the benefit of activating the dopant at a temperature of 800 – 1100° C for sufficient time in column 3, lines 15 – 20.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Fukasaku and anneal the substrate for the benefit of activating the dopant at a temperature of 800 – 1100° C for sufficient time as taught by Ramkumar in column 3, lines 15 – 20.

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Regarding element 2, Tsai teaches rapid thermal annealing process in nitrogen atmosphere for 5 – 15 seconds for the benefit of in order to limit the degree of dopant diffusion within the substrate in column 5, lines 26 – 32.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Fukasaku and perform rapid thermal annealing process in nitrogen atmosphere for 5 – 15 seconds for the benefit of limiting the degree of dopant diffusion within the substrate as taught by Tsai in column 5, lines 26 – 32 so that a uniform oxidation layer is achieved.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Tokar can be reached on 571 272 1812. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Asok K. Sarkar
September 9, 2004

Patent Examiner